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AUTHOR Ioup, Georgette; Kruse, Anna
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ABSTRACT

Current research on adult second language learning suggests that study is necessary to separate interference variables from intralinguistic variables and to determine the relative difficulty of structures in each group. This research on the acquisition of the English relative clause was specifically designed to test the transfer hypothesis specified by Lado. In the first portion of the study the role of interference is investigated; in the second part, a definition of a natural difficulty ordering for the stages of relative clause acquisition is proposed. Grammaticality judgments were elicited by presenting speakers of several different languages with a written list of 36 sentences, each containing a relative clause structure. Subjects were asked to judge them as structurally correct or incorrect. The main question was whether it is language group, sentence type, or a combination of the two that is more predictive of a learner's performance. Results show that sentence type rather than native language background is the most reliable predictor of error. An attempt is made in the second part of the study to ascertain if there exists a natural difficulty ordering among the various types of relative clause structures. If such an ordering is found to exist, it might be determined to what extent it reflects the acquisition strategies employed by first language learners of English. (AMH)

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Interference versus Structural Complexity as a Predictor of Second Language Relative Clause Acquisition

Georgette Ioup
Anna Kruse
University of Washington

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Two questions are very central in current studies of adult second language acquisition. Researchers are asking to what extent a learner's competence at any given stage is influenced by knowledge of the native language, and the related question of how closely the adult's acquisitional stages approximate first and second language acquisition in children. Hypotheses addressing these questions were first put forward by Fries (1945) Lado (1957) and their contemporaries. They claimed that all difficulty in learning a second language arose from the interference effects of the native language and not from any inherent difficulties in the target language. Fries, in a forward to Lado (1957), unambiguously states this position:

> Learning a second language, therefore constitutes a very different task from learning the first language. The basic problems arise not out of any essential difficulty in the features of the new language themselves but primarily out of the special "set" created by the first language habits.

Such a narrow view of second language acquisition was soon challanged. Many researchers (for example Pit Corder, 1971; Nemser, 1971; Richards, 1971; and Selinker, 1972) insisted that a variety of factors were responsible for the problems encountered in learning a second language. Intrinsic intralingual complexities were claimed to influence a learner's developmental progress to as great an extent as native language transfer. Richards (1971) is clear on the importance of both learning variables:

> Interference from the mother tongue is clearly a major source of difficulty in second language learning, and contrastive analysis has proved valuable in locating areas of interlanguage interference. Many errors however, derive from the strategies employed by the learner in language acquisition, and from the mutual interference of items within the target language. (p. 214)

Empirical work remained to be done to substantiate the newer contentions. As studies attempted to confirm the role of intratinguistic factors, the importance of interference was downgraded. A new account of second language learning was then proposed which excluded native language transfer as a significant learning variable. It's chief advocates were Dulay and Burt(1974a & b). Their position gained credence as a result of several studies which demonstrated little evidence of interference in both child and adult L_2 acquisition. One such study, researched by Ervin-Tripp (1974), investigates the learning experience of English speaking children acquiring French. Interference could not account for their linguistic behavior in both elicited and spontaneous productions, leading Erivn-Tripp to conclude that "second language learners recapitulate mother tongue acquisition" (p.121). Dulay and Burt (1974a) come to similar conclusions after studying the acquisition of English morphology by Chinese and Spanish speaking children. Morpheme difficulty orderings for the two groups were established and were shown to be highly correlative, findings which argue for the L_2 system, rather than the L_1 system, as a guide to L_2 acquisition. This leads them to reject first language habits as productive predictors of children's acquisition of second language syntactic processes.

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Other researchers have extended these results to adult ESL learners. Cook (1973) discovers that child first language learners and adult second language learners produce the same types of errors in imitation tasks involving English relative clause structures. Bailey, Madden and Krashen (1974) replicate the Dulay and Burt morpheme acquisition study with adult learners and determine that a similar difficulty ordering obtains between both the child and adult L_2 learners.

The issue, however, is far from resolved. Though these studies do not attest significant native language interference, other studies do. Hakuta (1975) in a case study of a Japanese child learning English observes errors in her spontaneous speech which he can only attribute to transfer. His data include cases of lexical transfer and evidence for structural avoidance. He rejects the thesis advocated by Dulay and Burt and recommends in its place a return to the interlanguage hypothesis which accounts for the learner's stages of competence through an interaction of three factors: overgeneralization, simplification and transfer.

In two different studies Schachter (1974) and Schachter, Tyson and Diffley (1976) report evidence of transfer in adult acquisition. Their studies are noteworthy because they systematically compare subjects from several different language backgrounds along dimensions which are selected because of the particular difficulties they are expected to present to each language group. If it is the case that the structures are either randomly troublesome, or difficult for all (or none) of the language groups, it becomes necessary to reject the interference hypothesis for these structures. It would then be necessary to attribute any difficulties to the complexities inherent in the structures. Conversely, should the predictions be borne out, the interference theory would be confirmed.

Unfortunately the results of both studies are mixed and do not provide clear support for either position. In the first study Schachter examines only spontaneous performance data. Some expected errors are observed, others are not. Schachter concludes that avoidance of structural types is evidence that the structure is posing problems for that particular language group. We contend that there is no justification for this conclusion. One never knows why speakers choose to express their thoughts using one syntax rather than another. If mother tongue interference is playing a role it may be at the stylistic level rather than the structural level. Avoidance gives us no clues as to why a learner might find that structural type difficult. Studying performance, therefore, can only provide limited insight into the learner's level of competence at a particular stage of acquisition.

Schachter, Tyson and Diffley acknowledge the limitations of performance studies in designing a second investigation. They argue convincingly that it is necessary to gather intuitional data in order to completely characterize a learner's knowledge at some particular stage. A description of the learner's system which is based entirely on spontaneous production data will account for only a small fragment of the learner's knowledge of the target language. This study elicits grammaticality judgments on English sentences from speakers with five different native language backgrounds: Japanese, Chinese, Persian, Arabic and Spanish. Unfortunately, the results again are mixed and no firm conclusions as to the role of interference can be drawn from their investigation.

So despite an abundance of current research, there are still no firm answers to the questions posed at the beginning of this paper. Researchers disagree on the extent to which transfer influences second language acquisition and the data present conflicting results. But until we are able to define the role of interference pre-

cisely, it will be impossible to isolate a set of intralinguistic variables and assess their role in learning. Thus it is necessary to conduct research designed to separate interference variables from intralinguistic variables and then determine the relative difficulty of structures in each group. In doing this, we not only shed light on the processes involved in second language learning, but also contribute to our knowledge of language universals and the general principles of language acquisition.

The research we are reporting on focuses on the acquisition of the English relative clause. In the first portion of the study we investigate the role of interference; in the second part we attempt to define a natural difficulty ordering for the stages of relative clause acquisition. The research incorporates two of the operational principles outlined in Schachter (1974) and Schachter et al. (1976). Subjects are selected from a number of very different language backgrounds. The native languages involved are Spanish, Persian, Japanese, Arabic and Chinese. Intuitional judgments rather than spontaneous or elicited productions provide the data base for our investigation.

Research Design

Relative clause structures from our subjects' native languages were compared to English along four dimensions, shown in Table I. A contrastive analysis (CA) theory of interference as defined in Lado (1957) and advocated in Schachter (1974) assumes that we can predict which aspects of a structure will cause difficulty by determining where the points of structural contrast lie. Any distinct difference is expected to impede the acquisition of the structure along that dimension. CA further argues that a partial overlap, where one unit in the native language corresponds to two or more units in the target language will present maximum learning difficulty. Table I reflects these assumptions by underlining the cells in each column where partial overlap occurs and therefore where the CA hypothesis anticipates the greatest number of errors.

Table I. Classification of Relative Clauses Along Four Dimensions

	Pronoun Retention	R.C. Position	Rel Marker Appearance	Rel Marker Morphology
Chinese	sometimes	precedes head	always	invariable
Japanese	none	precedes head	none	-----
Arabic	sometimes	follows head	sometimes	invariable
Persian	sometimes	follows head	always	invariable
Spanish	none	follows head	always	variable
English	none	follows head	sometimes	variable.

We observe then that in terms of pronoun retention inside the relative clause, Chinese, Arabic and Persian exhibit partial overlap with English, retaining the pronoun in some NP positions but not in others; while Japanese and Spanish pattern like English. Thus we expect high levels of difficulty from Chinese, Arabic and Persian speakers within the category of pronoun retention, but little or no difficulty for Japanese and Spanish speakers.

Relative clauses may either precede their head noun as in Chinese and Japanese; or follow the head noun as in Arabic, Persian, Spanish and English. We would predict then, that Japanese and Chinese speakers would exhibit the most errors here.

All of the languages studied except Japanese use a relative marker with the relative clause (e.g. English that or who). In English, the marker is often deleted in the surface form of the sentence by a rather complex rule. It states, in general, that a relative pronoun may be optionally deleted if the embedded verb will not then be mistaken as a main verb. Arabic is the only other language in our group which permits deletion of the relative marker. In Arabic the rule for deletion is quite different from the English rule and it functions obligatorily. The relative marker must be used when the antecedent is definite, but is obligatorily omitted with indefinite antecedents. The CA hypothesis predicts that though speakers from all five language backgrounds will have difficulty mastering the English rule, the Arabic speakers will have greatest difficulty.

Our fourth category is relative marker morphology. In Spanish and English the markers are inflected, but according to different inflectional criteria. The other languages which have markers do not inflect them at least not in their spoken forms. Therefore, although all five language groups are expected to have difficulty mastering the English inflectional system, we anticipate more errors among Spanish speakers due to the partial overlap between the two languages.

Method

We elicited grammaticality judgments by presenting subjects with a written list of 36 sentences each containing a relative clause structure. Subjects were asked to judge them as structurally correct or incorrect. The malformed relative clauses varied along the dimensions specified in Table I and the well-formed sentences were those to be used in the second part of this study, and will be referred to later in the paper. The sentences were presented in random order. Examples of the malformed relative clauses are listed below. (For a complete list of the deviant sentences used in this study, refer to Appendix A).

Table II. Sample Deviant Sentences

1) Pronoun retention in the relativized position

   *The bed which the boy put the shoes under it is i the corner.

2) Relative Clause Preposing

   *The eats a big breakfast girl is very strong.

3) Relative Marker Deletion

   *The girl was last in line didn't get a ticket.

   The woman James met is my sister. (Correct in English)

4) Incorrect Pronoun Morphology

*John hates which his brother likes.

The subjects consisted of 18 speakers of Spanish, 16 speakers of Chinese, 18 speakers of Persian, 10 speakers of Japanese and 25 speakers of the Saudi Arabian dialect of Arabic. These 87 subjects were randomly chosen from among low and middle intermediate level students enrolled in English as a Second Language classes at four Seattle area universities. Subjects were instructed to read the sentences and to place an 'X' in front of any that they felt were not correct sentences of English. They were told to concentrate on the grammar and to ignore strangeness in meaning or questions of spelling and punctuation. There was no time limit.

Results

The main question we are attempting to deal with at this point is whether it is language group, sentence type, or a combination of the two that is more predictive of a learner's performance. In order for our results to establish a transfer effect, it is necessary that either the main effect of language group or the interaction of language group with particular sentence types be significant as compared with the variation across individual subjects. Table III indicates the mean score of incorrect responses per cell.

Table III. Analysis of Deviant Sentences: Mean Score of Incorrect Responses

	Pronoun Retention N=8	R.C. Position N=4	Rel Marker Appearance N=6	Rel Marker Morphology N=8
Chinese N=16	49.2	23.4	47.9	24.2
Japanese N=10	35	25	38.3	22.5
Arabic N=25	68.5	31	40.7	47.5
Persian N=18	37	12.5	37	11.1
Spanish N=18	47.2	27.8	41.7	45.8

To evaluate the data, we used a two way analysis of variance design modified to screen out unequal N's, repeated measures and nested subjects, so that we could determine whether any group response differed significantly from the individual variation within groups. We were interested to see initially whether language group, sentence type, or a combination of the two predicted performance to any extent. Significance was set at the .001 level since an effect was predicted. Our findings show that the main effect of language group did not turn out

to be significant, neither did the interaction between language group and sentence type. However, we found the main effect of sentence type to be highly significant. These results indicate that although the main scores for each language group on a particular sentence type look very different, the variation among the individual scores was great enough that the differences were not actually significant. Thus any differences between mean scores for language groups on a given sentence type might will disappear in testing further samples. Since the interaction of language group and sentence type was not found to be significant, we were assured that no pattern of ease for one language group and difficulty for another on a given sentence type was cancelling out a main effect. Therefore, we were assured that the only effect that was significant was that of language type. The lack of any significant interaction precluded the necessity for finer statistical analysis.

Our results show that, contrary to the CA hypothesis, sentence type rather than native language background is the most reliable predictor of error. The question then arises as to why certain of the structural parameters tested are more difficult to master than others. In order to answer this question we must first determine whether the four sentential categories can be arranged into a difficulty ordering. To do this, we totaled the mean scores of all subjects on a sentence type - having ruled out the individual language factor - and did a series of difference of means t-tests, adjusting for the same error term as required for the analysis of variance. Significance was set at the .01 level for a 1-tailed test. The total mean score for each sentence type is presented in Table IV. The differences were found to be significantly different enough to permit them to be ordered.

Table IV. Total Mean Score of Incorrect Responses According to Sentence Type

Pronoun Retention	R.C. Position	Rel Marker Appearance	Rel Marker Morphology
47.38	23.94	41.12	30.22

When we rank order the four structural categories in terms of their relative difficulty, we arrive at the following difficulty ordering. Decisions concerning pronoun retention are the most problematic, followed by questions of relative marker deletion, relative marker morphology and relative clause position, in that order. We can explain the low error total on relative marker position since fundamental word order is one of the earliest concepts acquired in learning a new language, both first and second. Relative pronoun morphology will cause some learning difficulty, but, in learning to form the relative clause, the rules governing morphological distribution are the ones given particular attention in the classroom and are usually practiced and tested until error free performance is reached. The rule for marker deletion is complex and optional in English, therefore it is not surprising that our subjects who are not very advanced have not yet mastered it. What is surprising is that pronoun retention is a problematic area for all language groups, even those where such errors are not expected. Furthermore, in talking with our subjects' language teachers we found that problems of pronoun retention receive special focus in the classroom. How then can we expain the high occurrence of errors in this category for all language groups?

E.L. Keenan (1972a) argues that pronominal reflexes at the surface level are

common in many languages of the world precisely because they are very natural manifestations of the underlying logical structure of the language. Furthermore, they are retained at the surface most frequently when an aid to comprehension is required due to the structural complexity of the sentence. These pronouns function cognitively to assist in perceptual coding. We propose that language learners systematically employ pronominal reflexes in the beginning stages as a perceptual heuristic to simplify the coding task. In fact, we have noticed that advanced learners who do not ordinarily do so will employ pronominal reflexes quite naturally when sentences reach a certain level of complexity, as for example: "That's the man who Sally told Ellen her mother was talking about him."

Keenan (1972b) has further theorized that there exists a natural ordering within the category of pronoun retention, with genitive and preposition object pronouns the most likely to be retained, and the retention of subject and direct object pronouns the least common. The ordering is based on the observation that in natural language, relative clause formation is more natural and hence more accessible with relative clause subjects and objects than with genitives and preposition objects. He has demonstrated that sentences containing relative clause structures formed on these latter two positions are perceived as structurally more complex than corresponding sentences with the relative clause formed on either the subject or direct object. It would follow then that our subjects would accept more readily a pronominal reflex in the less accessible relative clause positions.

Since the study included sentences exhibiting all four types of pronoun retention, we totaled the scores across language for each category and compared them to ascertain if subjects did indeed find it more natural to retain a pronoun in the less accessible relative clause positions. The test permitted 174 possibilities for error in each category. Total error count for each grammatical category is presented in Table V.

Table V. Total Error Count for Categories of Pronominal Reflex

Subject	Direct Object	Preposition Object	Genitive
64	64	106	104

We observe that the genitive and preposition object positions produced approximately one third more errors than either the subject or direct object positions. A difference of proportion t-test was done to determine if these differences were significant. Significance was found at the .01 level indicating that the natural difficulty ordering for relative clause formation proposed by Keenan provides a reasonable explanation of our subjects behavior.

Testing for Natural Sequences

Since the first part of the study was not able to locate significant structural interference in the acquisition of the English relative clause, an attempt was made to locate other factors which might account for the learning difficulties. The second part of this study attempts to ascertain if there exists a natural difficulty ordering among the various types of relative clause structures, resulting

from the strategies learners are using to process them. If such an ordering can be shown to exist, we then want to determine to what extent it reflects the acquisition strategies employed by first langauge learners of English. As we searched the linguistic literature for possible hypotheses to test, we were surprised to discover that there were three such hypotheses each making conflicting predictions about the same set of sentences. These sentences are listed below, followed by a a summary of the hypotheses made concerning them.

Table VI. Sentences Used to Establish a Difficulty Ordering

SS	The dish which fell on the floor broke in half. The picture which won the prize is hanging on the wall.
SO	The sweater which I found on the bus belongs to Susie. The candy which Billy gave me tasted good.
OS	The little girl is looking for the cat which ran away. The old woman picked some flowers which were growing in the park.
OO	The boys are reading the books which they borrowed from the library. The child ate the cookies which the neighbors baked.

Table VII. Summary of Hypotheses Tested

1. Kuno: Center Embedding is perceptually difficult and should be avoided. Supported by Slobin's Operating Principle D: Avoid interruptions of underlying linguistic units.

   OS > SS
   OO > SO

2. Keenan: The Accessibility Hierarchy will predict the order of acquisition: relative clauses formed on subjects will be easier than those formed on objects. Supported by Slobin's Universal D: Avoid rearrangement of underlying word order.

   SS > SO
   OS > OO

3. Sheldon: The Parallel Function Hypothesis: relative clauses where the relative pronoun has the same function as the head will be easier to acquire.

   SS > SO
   OO > OS

Kuno (1974) argues that center embedding reduces comprehensibility causing relative clause structures which are center-embedded to be perceptually more difficult than right branching clauses. The perceptual problems of nested constructions resulting from a strain on memory capacity were first predicted by Chomsky and Miller (1963). In relation to first language acquisition, Slobin (1971) predicts the late acqusition of center-embedded clauses, based on his operating principle D which states that there is pressure to avoid interruption of underlying linguistic untis. Menyuk (1969) observes that sentence final relative clauses appear first in the data before center-embedded ones. In our study this hypothesis predicts that the sentence types we have labeled OS and OO will be easier to process.

The second hypothesis is developed in E.L. Keenan (1975). As mentioned earlier Keenan has established an accessibility hierarchy for relative clause structures where those relative clauses with relativized subjects occur higher

on the hierarchy than those with relativized objects. He predicts that the more accessible relative clauses will be perceived as more natural and hance will be easier to process and learn. In testing done with school age children, he found that retention was better on relative clasue structures higher on the hierarchy. In English, Keenan's hypothesis receives independent support from another of Slobin's principles, Universal D1. It state that structures requiring permutation of elements will first appear in non-permuted form. Menyuk (1969) has observed that the earliest relative clauses do indeed appear without inversion. Keenan's prediction, then, is that the SS and OS sentence types will be considered grammatical more often than the SO and OO types.

The third hypothesis is put forth by Sheldon. Through testing she has done, Sheldon has ascertained that children have better comprehension of those relative clause structures where the relative pronoun performs the same function as the head. The parallel function hypothesis is presented to account for the processing strategies children use to interpret relative clauses. It follows from her hypothesis that relative clauses manifesting a parallel function will be acquired before those that do not. In reference to this study it predicts that the SS and OO sentences should be the least difficult to process.

Results

The three hypotheses make predictions concerning the same set of sentences, however, the predictions are conflicting. Each theory predicts that a different pair of relative clause structures will be easier to process and acquire. The total number of errors for each sentence type is given in Talbe VIII. Each category permits 174 possibilities for error. It is evident that subjects recognized the majority of well-formed relative clauses as grammatical.

Table VIII. Total Errors for Each Sentence Type

SS	45 (39%)
SO	30 (26%)
OS	13 (11%)
OO	26 (23%)

The statistical analysis used in the second part of the study was again a two way analysis of variants, adjusted for nesting, repeated measures and unequal cases per cell. The analysis yielded the following results. Errors according to language group were not significant at the .05 level, while errors according to sentence type were significant. However, there was no significant interaction.

Errors ere then totaled according to hypothesis. These figures are presented in Table IX. A modified t-test was used to determine the significance of the difficulty ordering obtaining between the pairs as specified in the three hypotheses. The Kuno hypothesis was confirmed, the Keenan hypothesis was not. Not only was the Sheldon hypothesis not confirmed, but the results go significantly in the opposite direction of what is predicted.

Table IX. Total Errors by Hypothesis

	Easier		Harder	
Kuno	OS / OO	= 39 (32%)	SS / SO	= 75 (68%)
Keenan	SS / OS	= 58 (51%)	SO / OO	= 56 (49%)
Sheldon	SS / OO	= 71 (62%)	SO / OS	= 43 (38%)

Our data therefore support only the Kuno hypothesis establishing center embedding as a parameter of perceptual complexity in relative clause processing. However, we do not believe that our results speak conclusively. Additional research needs to be conducted on this issue. Our testing procedures allow for reflection on the part of our subjects and as such would be classified by Krashen (1976) as "slow testing". Therefore, we are measuring both the acquired and learned competence of our subjects, as we have no way of factoring out one of the measures. But it is necessary that a natural difficulty ordering be based on acquired knowledge alone, if it is to provide a comparison of first and second language acquisition.

Conclusion

Our research was specifically designed to test the transfe hypothesis specified by Lado, and it was found to be wanting. With respect to the syntactic aspects of language, Lado confines his analysis to word order and surface morphology. By and large, the studies which have not demonstrated a transfer effect have restricted their investigations to these structural parameters, while other studies which claim evidence of interference have extended the scope of their research to include semantic, pragmatic and stylistic variables. Perhaps Lado's variables are not the aspects of the native language which interfere with the acquisition of a new language. Yet Lado's account of interference is the only lucid treatment that exists to date. No linguist since Lado has attempted a systematic analysis of the linguistic variables in the native language which influence hypothesis formation in learning a new language. Furhtermore, to claim that transfer is a viable factor in second language learning, is it necessary to demonstrate the intrusion of native language structures and strategies at every point where a contrast between the two languages occurs? If not, then we require a new hypothesis defining precisely where transfer is expected and an explanation as to why it is confined to these aspects of language acquisition. Until such a theory is developed to guide our research, we can expect that studies investigating different components of second language acquisition will continue to come to radically different conclusions about the role of L_1 competence in acquiring L_2.

Appendix A

Malformed Test Sentences

Pronoun Retention

Subj: The boy saw the girl who she hit him.
The girl who she chased the bird fell down.

Obj: The baby which the man is holding it is crying.
The woman saw the man whom she photographed him.

Prep Obj: The girl whom the dog barked at her fell down.
The bed which the boy put the shoes under it is in the corner.

Poss: We found the baby that his mother went away.
The boy that the dog bit his hand is crying.

Relative Clause Preposing

Subj: I am looking for the in my purse comb.
The eats a big breakfast girl is very strong.

Obj: The Susan wrote a letter to girl never answered it.
The milk spilled on the Martin just washed floor.

Relative Marker Deletion

Subj: The man liked the baby was smiling.
The girl was last in line didn't get a ticket.

Obj: The woman James met is my sister.
I ate the food Fred cooked. (Correct in English)

Poss: The child's mother hit him is crying.
I helped the boy's father is sick.

Relative Marker Morphology

who: I like people which are friendly.
The girl which discovered the money received a reward.

which: The book whom you're looking for is on the table.
John threw the ball who broke the window.

whose: The man which hat I found in the park visited me.
My brother knows the boy which are was broken.

what: I kept who Susan gave me.
John hates which his brother likes.

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